SPACE CENTER
# Roundup

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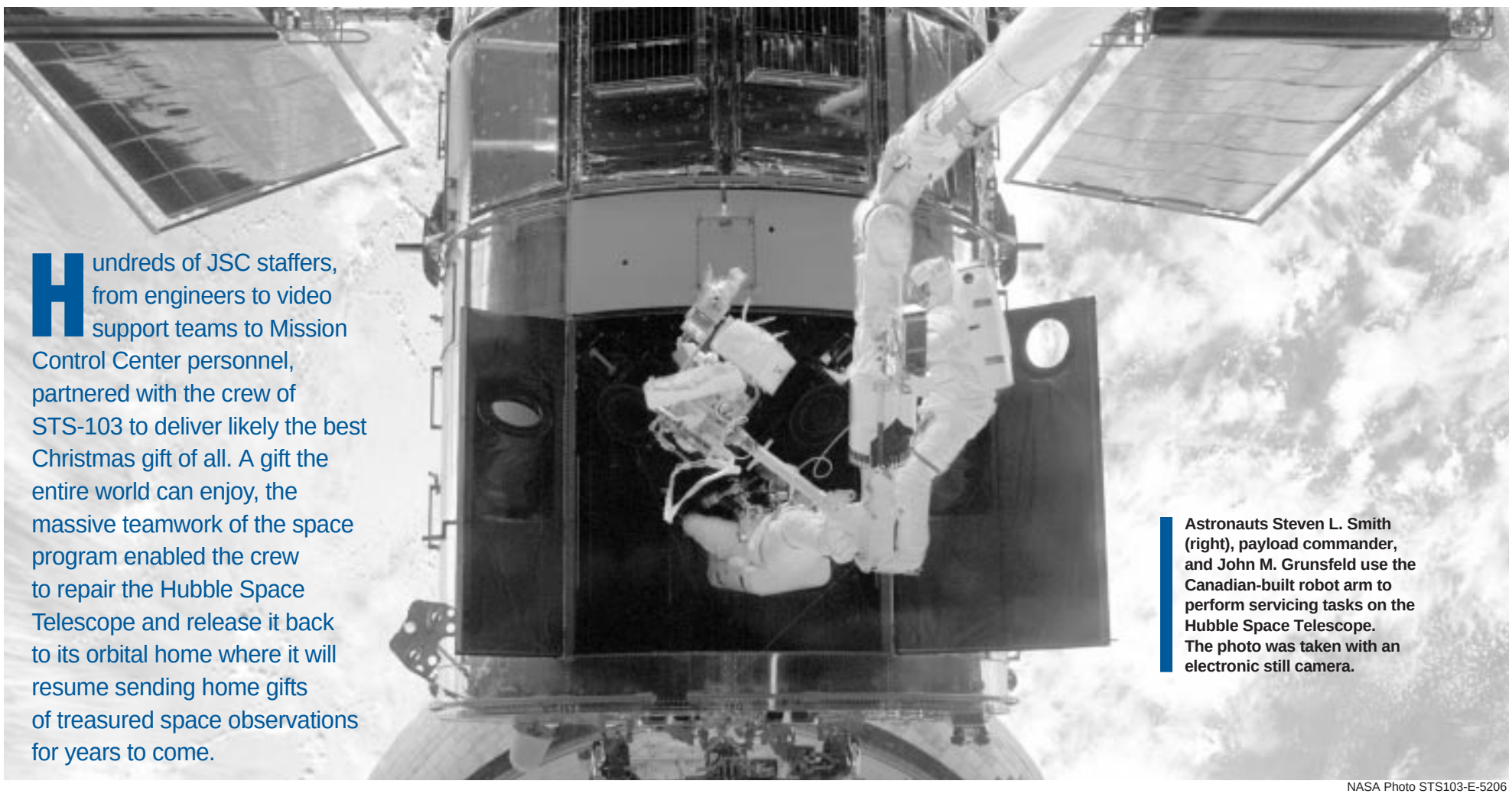
# Christmas wish comes true for Hubble team



Hundreds of JSC staffers, from engineers to video support teams to Mission Control Center personnel, partnered with the crew of STS-103 to deliver likely the best Christmas gift of all. A gift the entire world can enjoy, the massive teamwork of the space program enabled the crew to repair the Hubble Space Telescope and release it back to its orbital home where it will resume sending home gifts of treasured space observations for years to come.

**Astronauts Steven L. Smith (right), payload commander, and John M. Grunsfeld use the Canadian-built robot arm to perform servicing tasks on the Hubble Space Telescope. The photo was taken with an electronic still camera.**

NASA Photo STS103-E-5206

The STS-103 crew, comprised of Commander Curt Brown, Pilot Scott Kelly and Mission Specialists Steven Smith, Jean-François Clervoy, John Grunsfeld, Michael Foale and Claude Nicollier, began its successful eight-day mission with a breathtaking night launch from Kennedy Space Center Sunday, December 19, at 6:50 Central time. The first two days of the mission allowed *Discovery*, traveling at 17,500 mph, to catch up with the serene HST. Hubble had been operating in safe mode since mid-November when a fourth gyroscope became inoperable. The HST needs at least three of its six gyroscopes to maintain its precise pointing ability. When the fourth gyroscope failed, the HST went into safe mode ensuring the telescope received sunlight to maintain operation of its electrical systems.

On rendezvous day, Brown manually piloted the 110-ton orbiter to within 35 feet of the delicate telescope. Clervoy, European Space Agency astronaut, captured the telescope using the shuttle's robotic arm and maneuvered it into the payload bay where it could be accessed for the maintenance and hardware replacement activities.

The remaining four mission specialists divided into two teams to conduct three EVAs during the next three days.

During the first space walk, Smith and Grunsfeld completed the two highest priority objectives for the mission – installing six new gyroscopes into the aimless telescope as well as six Voltage/Temperature Improvement Kits. The pair completed those objectives but a few minor hindrances extended the EVA beyond its scheduled duration.

The gyroscopes were installed in three Rate Sensor Units, each housing two gyroscopes. A tight fit in a stowage container caused difficulty preparing one of the old RSUs for its return flight home. Additional time also was needed for opening valves and removing caps on the Near Infrared Camera and Multi-Object Spectrometer. The EVA lasted eight hours and 15 minutes, exceeding Tammy Jernigan's and Dan Barry's seven-hour and 55-minute EVA during STS-96 last year to become the second longest space walk in history.

Foale and Nicollier followed with the third longest space walk, eight hours and 10 minutes, as they installed a new advanced computer into the 9-year-old telescope. The new computer promises to increase Hubble's computing power, speed and storage capabilities. Early functionality tests showed that the new computer was operating nominally. The pair also replaced a fine guidance sensor aboard Hubble.

The third and final mission space walk continued the tradition of setting duration records. During their eight-hour, eight-minute EVA, Smith and Grunsfeld completed the fourth longest space walk. During their second EVA, the astronauts installed a new radio transmitter that Hubble will use to send scientific data to the ground. They also replaced a reel-to-reel tape recorder with a new, improved solid-state digital recorder. The new recorder provides more than 10 times the storage capability of the previous device.

> ***The Hubble Space Telescope is now orbiting freely once again and is in fantastic shape.***
>
> – John Campbell

The mission events lined up for a wonderful holiday treat for the entire space program, and the world, as the crew of STS-103 re-deployed the HST, with numerous improvements in capability, Christmas Day to continue its legendary life as an orbital observatory.

Later, the Space Telescope Operations Control Center at Goddard Space Flight Center announced that the HST was operating normally after its release. The Hubble team planned two weeks of follow-up testing to confirm all the systems were operational before initiating new observations.

"The spacecraft is being guided by its new gyros under the control of its brand new computer," Hubble Space Telescope Program Manager John Campbell said after the release. "The Hubble team is very grateful to the *Discovery* crew, to the launch and flight teams and to all those who made the mission so successful. We especially thank the families of the entire STS-103 team, who made so many personal sacrifices this holiday season, enabling the Hubble Space Telescope to resume its voyage of discovery."

The crew spent December 26 preparing the orbiter for its return to Earth the following day. The repair mission, which was a splinter mission from an original servicing mission scheduled for 2000, concluded Monday, December 27, with the 20th consecutive landing at Kennedy Space Center's Shuttle Landing Facility and the program's 12th night landing. The final touchdown at 6:01 p.m. Central time was the second of three landing opportunities for that day, the first being 'waved off' after 16-knot winds and strong turbulence exceeded weather requirements. ■

White Sands holds Safety & Total Health Day.

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Events of 1999 reviewed in pictures.

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Images from *Discovery*'s latest mission.

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